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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/534,592	10/05/2005	David Anthony Barrow	930058-2004	6831

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EXAMINER	
CHAUDRY, ATIF H	
ART UNIT	PAPER NUMBER
3753	
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12/09/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/534,592	BARROW ET AL.	
	Examiner	Art Unit	
	ATIF H. CHAUDRY	3753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *21-31,33-42,45-48 and 50* is/are pending in the application.

4a) Of the above claim(s) *23-27,29,30 and 37-39* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *21,22,28,31,33-36,40-42,45-48 and 50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 May 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 09/30/09 has been entered.

Applicant's amendment as filed on 09/30/09 has been entered. The amendment amended claim 21. Currently claims 21-31, 33-42, 45-48 and 50 are pending in this application and claims 23-27, 29-30, 37-39 are withdrawn.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 21, 22, and 28 are alternatively rejected under 35 U.S.C. 103(a) as being unpatentable over Burns (PG Pub 20030145894) in view of Takehiko (JP2002277478).

4. Regarding claims 21 and 22, Burns (Fig. 5-9) discloses a device comprising first and second inlet passages 9, 10 for respective immiscible fluids, the first and second inlet passages merging into a third passage 11 along which, in use, the two fluids flow under parallel laminar flow conditions (lines 9 & 10 are parallel in Fig. 9), the third passage 11 being formed with a discontinuity 1, in use, causing the two fluids to form into a flow of alternate segments. Burns fails to disclose the fluids flowing in intimate contact with each other along the third conduit. Takehiko (Fig. 1) teaches a microfluidic fluid flow device, comprising inlet passages 20A, 20B merging together into a third conduit 30 causing the fluids from the first and second conduits flow parallel to one another and in intimate contact with each other until they reach a discontinuity (outlet). It would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided the device disclosed by Burns with a portion of the first and second inlet flows in parallel intimate contact with each other as taught by Takehiko in order to avoid mixing by preventing the fluid steams striking each other at an angle at the discontinuity.

5. Regarding claim 28, Burns (page 3, line 29) discloses a segmented flow device comprising pathways made of fluoropolymer to avoid sticking.

6. Claims 31, 33-35 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burns (PG Pub 20030145894) in view of Ekstrom et al. (US Patent 5376252) further in view of Mets et al. (US Patent 3537889).

7. Regarding claims 31, 33, 34, and 48, Burns (Fig. 4-9) discloses a method of producing segmented flow using a device comprising a first conduit 11 provided with a discontinuity (intersection) 1 where it splits into two parallel inlet passages 9, 10 which provide immiscible fluid to merge at the intersection and cause segmented laminar flow of the first and second fluids downstream of the discontinuity. Burns (Fig. 14) discloses device comprising of flow channels made by two substrates disposed faced to face and surface of one substrate profiled to define conduits. Burns fails to disclose substrates encased in casement layers. Ekstrom et al. (Fig. 9) teaches two layers of substrates 21, 23 having fluid passages defined in between and encased by casement layers 24, 25. It would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided the flow device disclosed by Burns, with encasement layers as taught by Ekstrom et al. in order to provide an outer protection for the substrate layers and keep them together. Burns as modified fails to disclose substrates disposed in a cavity formed by casement layers. Mets et al. (Fig. 2) teaches substrates 14, 15 disposed in cavities 11, 12 formed between casement layers 10, 13. It would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided the flow device disclosed by Burns as modified, with cavities in encasement layers as taught by Mets et al. in order to provide a secure location for placement of substrates.

8. Regarding claim 35, Burns (page 3, line 29) discloses a segmented flow device comprising pathways made of fluoropolymer to avoid sticking.

9. Claims 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burns (PG Pub 20030145894) in view of Ekstrom et al. (US Patent 5376252) and Mets et al. (US Patent 3537889) alone or further in view of Takehiko et al. (JP2002277478).

10. Burns fails to discuss different flow rates but the difference in size of slugs in Fig. 8 would result inherently from different flow rates. Takehiko et al. (Fig. 1) teaches a device for producing segmented fluid flow, comprising inlet passages 20A, 20B merging into a third passage 30 causing segmented flow. Takehiko et al. teaches different sized alternate segments in figures 2 and 4, which inherently imply different flow rates of the two fluids. It would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided the flow device disclosed by Burns with different flow rates in each inlet passage as taught by Takehiko et al. in applications requiring different sized segments.

11. Claims 40, 41, 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burns (US PG Pub US 20030145894) in view of Ekstrom et al. (US Patent 5376252) further in view of Mets et al. (US Patent 3537889).

12. Regarding claims 40 and 41, Burns (Fig. 5-9) discloses a device comprising first and second inlet passages 9, 10 for respective immiscible fluids, the first and second inlet passages merging into a third passage 11 along which, in use, the two fluids flow under parallel laminar flow conditions, the third passage 11 being formed with a constriction discontinuity 1, in use, causing the two fluids to form into a flow of alternate

segments. Burns (page 3, line 29) teaches a segmented flow device comprising pathways made of fluoropolymer to avoid sticking. Burns (Fig. 14) discloses device comprising of flow channels made by two substrates disposed faced to face and surface of one substrate profiled to define conduits. Burns fails to disclose substrates encased in casement layers. Ekstrom et al. (Fig. 9) teaches two layers of substrates 21, 23 having fluid passages defined in between and encased by casement layers 24, 25. It would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided the flow device disclosed by Burns, with encasement layers as taught by Ekstrom et al. in order to provide an outer protection for the substrate layers and keep them together. Burns as modified fails to disclose substrates disposed in a cavity formed by casement layers. Mets et al. (Fig. 2) teaches substrates 14, 15 disposed in cavities 11, 12 formed between casement layers 10, 13. It would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided the flow device disclosed by Burns as modified, with cavities in encasement layers as taught by Mets et al. in order to provide a convenient location for placement of substrates.

13. Regarding claim 47, Ekstrom et al. (Fig. 9) teaches access openings 26 in the casement layer for fluid access to the passages formed in the substrates.

14. Regarding claim 50, Burns (Fig. 5-9) discloses a device comprising first and second passages 9, 10 having inlets for respective immiscible fluids, the first and second inlet passages merging into a third duct 11 along which, in use, the two fluids flow under parallel laminar flow conditions, the third passage 11 being formed with a

constriction discontinuity 1, in use, causing the two fluids to form into a flow of alternate segments. Burns (page 3, line 29) teaches a segmented flow device comprising pathways made of fluoropolymer to avoid sticking. Burns (Fig. 14) discloses device comprising of flow channels made by two substrates disposed faced to face and surface of one substrate profiled to define conduits. Burns (page 3, line 29) teaches a segmented flow device comprising pathways made of fluoropolymer to avoid sticking. Burns fails to disclose substrates encased in casement layers. Ekstrom et al. (Fig. 9) teaches two layers of substrates 21, 23 having fluid passages defined in between and encased by casement layers 24, 25. It would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided the flow device disclosed by Burns, with encasement layers as taught by Ekstrom et al. in order to provide an outer protection for the substrate layers and keep them together. Burns as modified fails to disclose substrates disposed in a cavity formed by casement layers. Mets et al. (Fig. 2) teaches substrates 14, 15 disposed in cavities 11, 12 formed between casement layers 10, 13. It would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided the flow device disclosed by Burns as modified, with cavities in encasement layers as taught by Mets et al. in order to provide a convenient location for placement of substrates. Burns (Fig. 9) discloses the first and second ducts 9, 10 as parallel to each other upstream of the third duct 11.

15. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burns (US PG Pub US 20030145894) in view of Ekstrom et al. (US Patent 5376252) and Mets et al. (US Patent 3537889) further in view of Kennedy (US Patent 6509085).

16. Burns as modified fail to disclose outer members holding the substrates. Kennedy (Fig. 2C) teaches a microfluidic device with outer clamps 220, 225 holding two substrates 5, 35 together. It would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided the flow device disclosed by Burns as modified, with clamping means as taught by Kennedy in order to secure together the two substrates.

17. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burns (US PG Pub US 20030145894) in view of Ekstrom et al. (US Patent 5376252) and Mets et al. (US Patent 3537889) further in view of Tomita et al. (US Pg Pub 20020040754).

18. Burns as modified fails to disclose interlocking features. Tomita et al. (Fig. 1, 3) teaches aligning pins 233, 534, 535 for aligning and locking-in-place substrates between base layer and clamps. It would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided the flow device disclosed by Burns as modified, with aligning pins as taught by Tomita et al. in order to provide alignment of the substrates and prevent relative movement.

19. Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burns (US PG Pub US 20030145894) in view of Ekstrom et al. (US Patent 5376252) and Mets et al. (US Patent 3537889) further in view of Nakase et al. (US Patent 6538308).

Burns as modified fails to disclose substrates in a cavity such that the depth of cavity is less than the thickness of the substrates. Nakase et al. (Fig. 12, col 16, line 44) teaches a system of securing substrates in a cavity formed by casement layers 5, 7 by press fitting the substrates in the cavity. It would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided the flow device disclosed by Burns as modified, with a press-fitting cavity as taught by Nakase et al. in order to secure together the two substrates. It would have been obvious to a person having ordinary skill in the art at the time of the invention that in order to press-fit the substrates in the cavity, the depth of the cavity would be less than the combined thickness of the substrates.

20. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burns (US PG Pub US 20030145894) in view of Ekstrom et al. (US Patent 5376252) and Mets et al. (US Patent 3537889) further in view of Kurimoto (US Patent 6027146).

21. Burns (Fig. 5-9) discloses a device comprising first and second passages 9, 10 having inlets for respective immiscible fluids, the first and second inlet passages merging into a third duct 11 along which, in use, the two fluids flow under parallel laminar flow conditions, the third passage 11 being formed with a constriction discontinuity 1, in use, causing the two fluids to form into a flow of alternate segments. Burns (page 3, line 29) discloses a segmented flow device comprising pathways made of fluoropolymer to avoid sticking. Burns (Fig. 14) discloses device comprising of flow channels made by two substrates disposed faced to face and surface of one substrate

profiled to define conduits. Burns (page 3, line 29) discloses a segmented flow device comprising pathways made of fluoropolymer to avoid sticking.

Burns fails to disclose substrates encased in casement layers. Ekstrom et al. (Fig. 9) teaches two layers of substrates 21, 23 having fluid passages defined in between and encased by casement layers 24, 25. It would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided the flow device disclosed by Burns, with encasement layers as taught by Ekstrom et al. in order to provide an outer protection for the substrate layers and keep them together.

Burns as modified fails to disclose substrates disposed in a cavity formed by casement layers. Mets et al. (Fig. 2) teaches substrates 14, 15 disposed in cavities 11, 12 formed between casement layers 10, 13. It would have been obvious to a person having ordinary skill in the art at the time of the invention to have provided the flow device disclosed by Burns as modified, with cavities in encasement layers as taught by Mets et al. in order to provide a convenient location for placement of substrates.

Burns as modified fails to disclose the first and second ducts 9, 10 as parallel to each other immediately upstream of the third duct 11. Kurimoto (Fig. 8A) teaches a method of merging two fluid streams into one comprising a first and second fluid paths 10, 11 merging into a third fluid flow 7 such that the first and second paths are parallel to each other immediately upstream of the discontinuity. It would have been obvious to a person having ordinary skill in the art at the time of

the invention to have provided the flow device disclosed by Burns as modified, with first and second ducts running parallel to each other immediately upstream of the third duct as taught by Kurimoto in order to provide a smooth flow to the discontinuity.

Response to Arguments

22. Applicant's arguments filed 09/30/09 regarding claims 21, 31, 40, and 50 have been fully considered but they are not persuasive. Applicant's argument that Burns fails to disclose a constriction or discontinuity is not persuasive since Burns teaches the conduit 11 having a discontinuity or constriction at intersection 5 which causes the segmented flow (the intersection of the third conduit with the first and second conduits is a discontinuity of the flow passage causing the flow to form into alternate segments since the intersection is a change in the flow section area and characteristics that causes change in continuous flow pattern). The claims do not require parallel flow in a single conduit but only recite laminar flow of the first and second fluids. In this regard, Burns shows laminar flow in the conduit 11 of both first and second fluids. Applicant's argument that Burns and Takehiko fails to disclose fluid flow parallel to one another and in intimate contact with each other is not persuasive since Takehiko (Fig. 1) teaches a microfluidic fluid flow device, comprising inlet passages 20A, 20B merging together into a third conduit 30 causing the fluids from the first and second conduits flow parallel to one another and in intimate contact with each other until they reach a discontinuity

(outlet). Kurimoto has been cited to show incorporation of first and second ducts running parallel to each other immediately upstream of the third duct.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ATIF H. CHAUDRY whose telephone number is (571)270-3768. The examiner can normally be reached on Mon-Fri Alternate Friday off 9-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robin Evans can be reached on (571)272-4777. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Atif H Chaudry/
Examiner, Art Unit 3753

/Robin O. Evans/
Supervisory Patent Examiner, Art Unit 3753